

CLAIMS:

1. A voltage reference generator circuit for generating a reference voltage of a predetermined value comprising:
 - 5 first circuitry adapted to generate a first voltage which is substantially independent of temperature and related to a component parameter susceptible to variations with process technology;
 - second circuitry adapted to generate an offset voltage of a value such that the sum of the first voltage and the offset voltage is said predetermined value, and
 - 10 wherein the second circuitry comprises components whose parameters are variably selectable without affecting the first voltage.
2. A voltage reference generator circuit according to claim 1, wherein the first circuitry comprises a bipolar transistor, the base emitter voltage of which is
- 15 susceptible to variations with process technology.
3. A voltage reference generator circuit according to claim 2, wherein the bipolar transistor has a collector connected to an upper supply rail, a base connected to an input node and an emitter connected to a resistive chain.
- 20 4. A voltage reference generator circuit according to claim 3, wherein the resistive chain comprises a current setting resistor and wherein the first circuitry comprises a voltage generator circuit adapted to generate a voltage which is proportional to absolute temperature across said current setting resistor.
- 25 5. A voltage reference generator circuit according to claim 3, wherein the second circuitry comprises a first compensation resistor connected between the resistive chain and a lower supply rail and having a resistance parameter which is variably selectable without affecting the first voltage, wherein the offset voltage is
- 30 taken across the first compensation resistor.

6. A voltage reference generator circuit according to claim 1, wherein the second circuitry comprises current generating circuitry.
7. A voltage reference generator circuit according to claim 6, wherein the
5 current generating circuitry comprises a current source and a bipolar transistor connected in series between upper and lower supply rails.
8. A voltage reference generator circuit according to claim 6, wherein the
10 current generated by the current generating circuit is supplied through first and second compensation resistors.
9. A voltage reference generator circuit comprising:
a first bipolar transistor connected in series with a resistive chain between
upper and lower supply rails and having an input node at its base;
15 a current generating circuit connected to supply a current to a node of said resistive chain, said resistive chain including a compensation resistor connected between said node and said lower supply rail;
voltage generating means for generating a voltage proportional to absolute
temperature across a current setting resistor of said resistive chain;
20 wherein the resistive value of the compensation resistor is selectable independently of the values of other components in the resistive chain, whereby an offset voltage across said compensation resistor is independently settable.
10. A voltage generator, comprising:
25 an offset circuit operable to develop an offset voltage and operable to adjust the offset value as a function of temperature; and
a voltage generation circuit coupled to the offset circuit, the voltage
generation circuit operable to develop a first reference voltage and adjust the value
of the first reference voltage as a function of temperature, and operable to provide
30 an output reference voltage equal to the first reference voltage plus the offset voltage.

11. The voltage generator of claim 10 wherein
the voltage generation circuit includes a bipolar transistor having a base-emitter voltage that is a function of temperature; and
the offset circuit includes a bipolar transistor having a base-emitter voltage
5 that is a function of temperature.
12. The voltage generator of claim 11 wherein
the voltage generation circuit includes a resistor network coupled between
an emitter of the bipolar transistor and a node; and
10 the offset circuit comprises a resistive element having a first terminal
coupled to the node and a second terminal adapted to receive a reference voltage.
13. The voltage generator of claim 12 wherein the resistor network comprises:
a first, second, and third resistor coupled in series between the emitter and
15 the node, and a temperature voltage developing element being coupled in parallel
with the second resistor.
14. The voltage generator of claim 12 wherein the offset circuit further
comprises:
20 a current source having a first terminal adapted to receive a supply voltage
and a second terminal; and
a resistive element having a first terminal coupled to a base of the bipolar
transistor and a second terminal coupled to the node; and
wherein a collector and the base of the bipolar transistor are coupled to the
25 second terminal of the current source and an emitter of the bipolar transistor is
adapted to receive a reference voltage.
15. An integrated circuit, comprising:
a voltage generator, comprising,
30 an offset circuit operable to develop an offset voltage and operable to adjust
the offset value as a function of temperature, and

a voltage generation circuit coupled to the offset circuit, the voltage generation circuit operable to develop a first reference voltage and adjust the value of the first reference voltage as a function of temperature, and operable to provide an output reference voltage equal to the first reference voltage plus the offset voltage.

16. The integrated circuit of claim 15 wherein the integrated circuit comprises a memory device.

17. An electronic system, comprising:

an integrated circuit, including,

a voltage generator, comprising,

an offset circuit operable to develop an offset voltage and operable to adjust the offset value as a function of temperature, and

a voltage generation circuit coupled to the offset circuit, the voltage generation circuit operable to develop a first reference voltage and adjust the value of the first reference voltage as a function of temperature, and operable to provide an output reference voltage equal to the first reference voltage plus the offset voltage.

18. The computer system of claim 17 wherein the integrated circuit comprises a memory device.

19. A method for developing an output reference voltage, the method comprising:

developing an offset voltage having a value that is substantially independent of temperature;

developing a first reference voltage having a value that is substantially independent of temperature; and

adding the offset voltage to the first reference voltage to develop an output reference voltage.

20. The method of claim 19 wherein developing the offset voltage comprises:

supplying a first current that is utilized in developing the first reference voltage through a resistive element, the first current having value that is a function of temperature; and

5 supplying a second current through the resistive element, the second current having a value that is a function of temperature and where the function of the second current is approximately the inverse of the function of the first current.

10 21. The method of claim 20 wherein the first current is approximately equal to the second current.

22. The method of claim 20 wherein developing the first reference voltage comprises:

15 developing a first voltage having a value that is a first function of temperature;

developing a second voltage having a value that is a second function of temperature, where the second function is approximately the inverse of the first function; and

20 adding the first and second voltages.

23. The method of claim 22 wherein the first voltage is approximately equal to the second voltage.

25 24. A method for developing a voltage having a desired value, the method comprising:

developing a first reference voltage that is substantially independent of temperature and has a value that is a function of process parameters of at least one component utilized in generating the first reference voltage;

30 developing an offset voltage that is substantially independent of temperature; and

adjusting the value of the first reference voltage with the offset voltage to develop the voltage having the desired value.

25. The method of claim 24 wherein adjusting the value of the first reference voltage with the offset voltage to develop the voltage having the desired value comprises adding the first reference voltage and the offset voltage.

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26. The method of claim 24 wherein developing the offset voltage comprises:

supplying a first current that is utilized in developing the first reference voltage through a resistive element, the first current having value that is a function of temperature; and

10 supplying a second current through the resistive element, the second current having a value that is a function of temperature and where the function of the second current is approximately the inverse of the function of the first current.

15 27. The method of claim 26 wherein the first current is approximately equal to the second current.

28. The method of claim 24 wherein developing the first reference voltage comprises:

20 developing a first voltage having a value that is a first function of temperature;

developing a second voltage having a value that is a second function of temperature, where the second function is approximately the inverse of the first function; and

25 adding the first and second voltages.

29. The method of claim 28 wherein the first voltage is approximately equal to the second voltage.